

Asymptomatic Urinary Tract Infection (Bacteriuria) in Pregnant Women attending AnteNatal Clinics in a Community Hospital

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Abstract

Urine samples were collected through informed consent over a one month period from fifty (50) pregnant women between the ages of 21-42 years attending antenatal clinics at a community hospital in Enugu metropolis, Nigeria. The samples were cultured within an hour after collection and the organisms were identified using various biochemical tests namely; Gram reaction, IMViC, oxidase and coagulase. The antibiotic sensitivity profile of each isolate was also identified using disc diffusion method. Out of 50 samples examined in this study, 26(52%) were found to contain appreciable bacteria growth, 13(26%) were found to contain moderate growth while 11 (22%) had scanty growth. *Escherichia coli* was highest, making up (36%) followed by *Staphylococcus aureus* (24%), *Klebsiella pneumoniae* (20%), *Proteus mirabilis* (8%), *Staphylococcus saprophyticus* (6%) and *Streptococcus pyrogens* (6%). This study showed that the highest number of uropathogens was found within the age brackets of 21-35 years which may be due to some predisposing factors such as sexual behaviours, use of contraceptives, allergic reactions amongst others.

Key Words: Bacteria, Pregnancy, Hospital, Sensitivity test, Urine

Introduction

Bacteriuria is a common infection in humans both in the community and hospital settings. It occurs in all age groups and gender but it is mostly common in women than in men partially due to the shorter and wider female urethra and its proximity to the anus [1, 2, 3]. The urinary tract includes the organs that collect and store urine and releases it from the body namely: the kidneys, ureters, bladder and the urethra [4]. Bacteria associated with bacteriuria include *Escherichia coli*, *Staphylococcus saprophyticus*, *Proteus mirabilis*, *Klebsiella pneumonia* and *Pseudomonas aeruginosa* [5], while symptoms range from pain or burning sensation while urinating to serious and life-threatening situations of renal scarring and sepsis [6, 7].

Bacteriuria is categorized as one of the three diseases of the urinary tract. Others are cystitis-which affects the bladder and pyelonephritis-which affects the kidney [8]. It's prevalence in pregnant women may be attributed to the profound physiological and anatomical changes during pregnancy facilitating the development of both symptomatic and asymptomatic features [3, 7,

9]. In the female human subject, the urinary tract has an important relationship with the reproductive organs because of its proximity. In the non pregnant state, the uterus lies just behind and partly over the bladder while in the pregnant state, the enlarging uterus affects all the tissues surrounding the urinary tract at various times. The vaginal microflora is normally made up of 5 to 15 different bacterial species, including aerobes and anaerobes of which *Escherichia coli* is most copious [10]. The physiological increase in plasma volume during pregnancy decreases urine concentration and up to 70% pregnant women develop glucosuria (glucose in urine), which encourages bacterial growth in the urine. Predisposing factors for bacteriuria are structure of the female urinary tract, sexual behaviour, contraceptives, menopause and allergies amongst others [11, 12, 13]. As a result of the findings establishing bacteriuria as a UTI in pregnant women from different parts of the country, this study was designed to enrich the information already available by determining the prevalence pattern of the microbes associated with bacteriuria in pregnant women attending antenatal clinic in Nike district of Enugu.

Materials and methods**Materials****Culture media and Reagents**

Nutrient agar, Cysteine Lactose Deficient agar, Blood agar base, MacConkey agar, normal saline, Triple sugar iron agar. Hydrogen peroxide, crystal violet, methylene blue, lugol's iodine, alcohol, safranin, Kovac reagent, methylated spirit, distilled water, barium chloride,

Antibiotic Discs

ofloxacin, rifampicin, chloramphenicol, ciprofloxacin, augmentin, gentamycin, cefuroxime, nalidixic acid, ampicillin

Methods**Study area**

This study was carried out in a community hospital located in Nike district of Enugu East Local Government Area. Nike district comprises of both indigenes and non indigenes and the predominant language spoken is igbo.

Sample collection

Subjects were instructed on how to obtain a clean catch mid stream urine sample in the morning into a sterile universal container. A total of fifty (50) urine samples were collected from the pregnant women. All the necessary information including gestational age was obtained by oral interview of each participant. The samples were transferred to the laboratory for analysis within an hour of collection.

Sample analysis

The urine samples collected were cultured on nutrient agar, blood agar, cysteine lactose electrolyte deficient agar and MacConkey agar. The plates were incubated at 37 °C for 24 hours under aerobic conditions. The bacteria isolates were identified using standard bacteriological procedures including Gram stain and other biochemical tests as described by Cheesbrough [14].

Antibiotic Sensitivity test

Antibiotic sensitivity of the isolates was determined using previously established procedure [15]. Briefly, the isolates were cultured in nutrient broth

at 37°C for 24 h. Two loopful of the suspension of each isolate were inoculated into 20ml of sterile molten agar in 10 cm diameter Petri dishes and mixed. The plates were allowed to set and the antibiotic Sensitivity discs were aseptically placed on their surfaces. The plates were incubated at 37°C for 24 h and the resultant inhibition zone diameters (IZDs) were measured and recorded.

Results

Out of 50 samples, examined in this study, 26 (56%) were found to contain appreciable bacteria growth, 13(26%) were found to contain moderate growth while 11 (22%) had scanty growth. A total of 5 organisms were isolated and *Escherichia coli* was the most commonly isolated, making up (36%), followed by *Staphylococcus aureus* (24%), *Klebsiella pneumoniae* (20%), *Proteus mirabilis* (8%), *Staphylococcus saprophyticus* (6%) and *Streptococcus pyrogens* (6%). The biochemical characterization of the bacteria isolates are shown on Table 1.

Discussion

Escherichia coli was the predominant with an isolation rate of 26.5 %. This result is in line with the findings of Okonko *et al.*, [16]; Tamalli *et al.*, [13]; Turay *et al.*, [3], Nabbugodi *et al.*, [17] and Lawani *et al* [7]. They all reported *E. coli* was the predominant bacteria isolate in pregnant women under antenatal care. *E.coli* expresses several virulence factors which break the mucosal barriers of the urinary tract leading to its persistence thus serving as a reservoir for recurrent infections [18]. Anatomical and functional changes have been attributed to reduce ureteric muscular tone leading to urinary stasis which encourages bacteria proliferation in urine. These facts with low personal hygiene during pregnancy increase the risk of urinary tract infection from *E.coli*. [17, 19] The presence of bacteriuria is generally higher in developing countries mostly attributed to poor economic situations, poor hygiene, lack of education and indiscriminate use of antibiotics amongst others [13,20, 21].

TABLE 1: BIOCHEMICAL CHARACTERIZATION OF THE ISOLATES

| TEST | <i>E. coli</i> | <i>K. pneumoniae</i> | <i>Proteus spp</i> | <i>S. aureus</i> | <i>S. saprophyticus</i> | <i>S. pyrogens</i> |
|---------------|----------------|----------------------|--------------------|------------------|-------------------------|--------------------|
| Gram reaction | - | - | - | + | + | + |
| Oxidase | - | - | - | - | - | - |
| Indole | + | - | - | - | - | - |
| Coagulase | - | - | - | + | - | - |
| Catalase | + | + | + | + | + | - |
| Lactose | + | - | - | - | - | - |
| Mannitol | - | - | - | + | + | - |
| Sucrose | - | + | + | + | + | - |
| Citrate | - | + | + | - | - | - |

Key: + Positive; -Negative

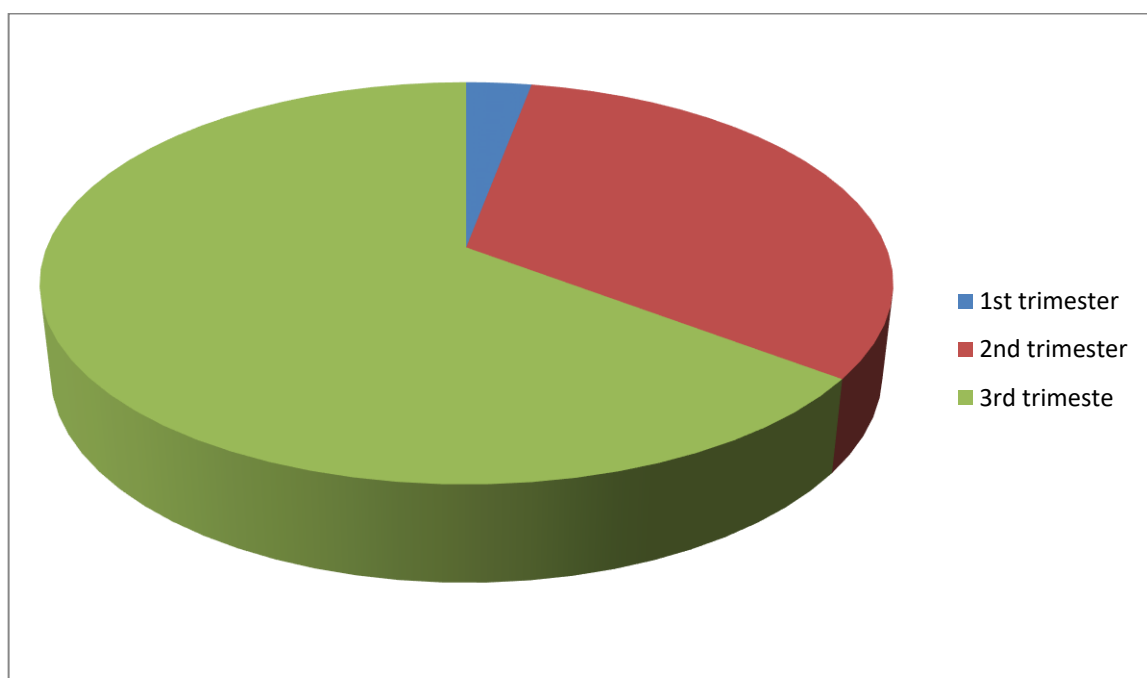
TABLE 2: AGE DISTRIBUTION OF PREGNANT WOMEN WITH BACTERIURIA

| Age groups(years) | No. tested (%) | No. positive (%) | No. negative (%) |
|-------------------|----------------|------------------|------------------|
| 21-25 | 5(10%) | 4(80%) | 1(20%) |
| 26-30 | 22(44%) | 15(68.2%) | 7(31.8%) |
| 31-35 | 18(36%) | 10(55.6%) | 8(44.4%) |
| 36-42 | 5(10%) | 3(60%) | 2(40%) |
| Total | 50(100%) | 32(64%) | 18(36%) |

Table 2 shows the incidence of UTI in relation to the age of the pregnant women. The highest number of positive persons was found within the age groups of 26-30 years followed by 31-35 years and 21-25 years while the lowest number was found within the age brackets of 36-42 years. This is because the women within this age group were more sexually active and also, the risk of UTI is commonly associated with increase in age.

TABLE 3: ANTIBIOTIC SUSCEPTIBILITY PATTERN OF THE BACTERIA ISOLATES

| ANTIBIOTICS | <i>E. coli</i> | <i>K. pneumonia</i> | <i>Proteus spp</i> | <i>S. aureus</i> | <i>S. saprophyticus</i> | <i>S. pyrogens</i> |
|-----------------|----------------|---------------------|--------------------|------------------|-------------------------|--------------------|
| Ofloxacin | 100% | 100% | 100% | 100% | 50% | 100% |
| Ciprofloxacin | 100% | 100% | 100% | 100% | 50% | 100% |
| Augmentin | 30% | 50% | 100% | 0% | 0% | 0% |
| Gentamicin | 100% | 100% | 20% | 25% | 0% | 50% |
| Ampicillin | 20% | 0% | 0% | 50% | 0% | 100% |
| Rifampicin | 0% | 0% | 0% | 100% | 100% | 100% |
| Cefuroxime | 0% | 50% | 0% | 100% | 50% | 100% |
| Chloramphenicol | 0% | 0% | 0% | 0% | 0% | 0% |
| Nalidixic acid | 0% | 0% | 20% | 12.5% | 0% | 30% |


FIGURE 1: INCIDENCE OF SIGNIFICANT BACTERIA GROWTH IN THE THREE TRIMESTERS

1st Trimester --- 2.9%
2nd Trimester ---- 32.4%
3rd Trimester ---- 64.7%

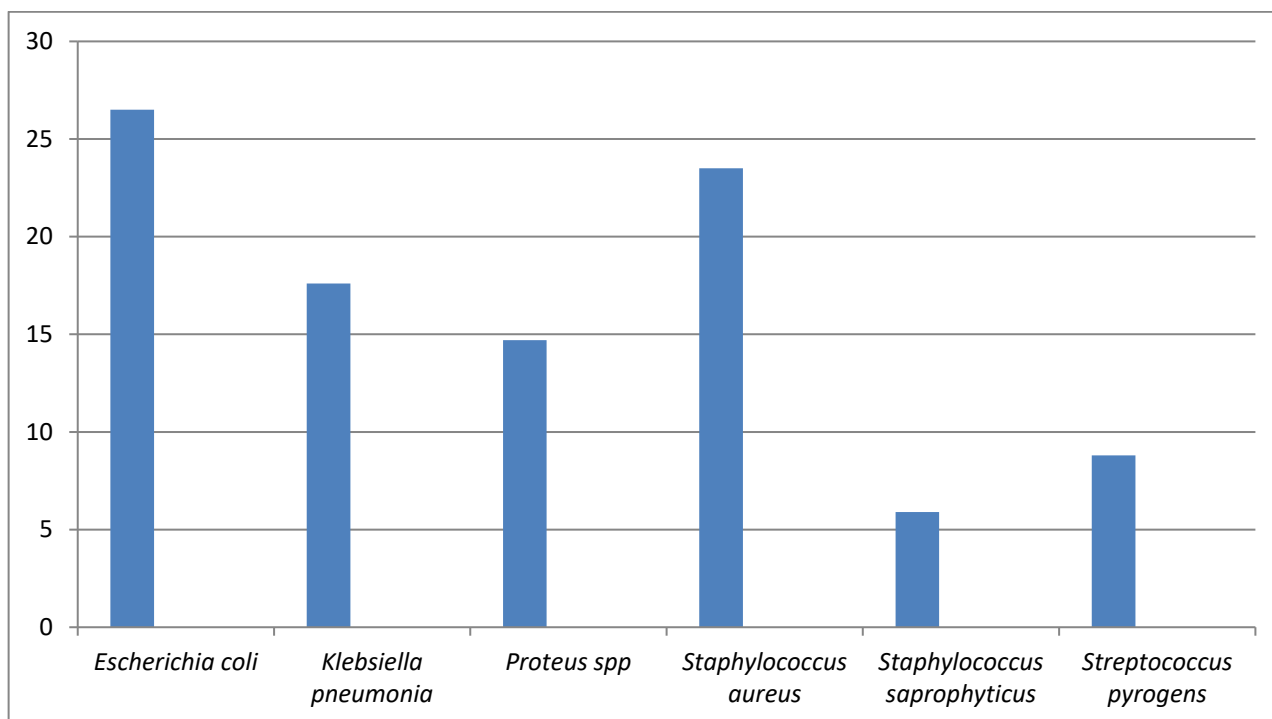


FIGURE 2: DISTRIBUTION OF BACTERIA ISOLATED FROM URINE SAMPLE

In relation to maternal age and the number tested, bacteria isolates were highest between ages 26-35 years. This result is similar to the findings of Akerele *et al.*, [22]; Adeyeba *et al.*, [23] and Akobi *et al.*, [24]. This may be due to the fact that women within this age are likely to have more children, are more sexually active, and nearly 1 in 3 women usually have at least suffered an episode of urinary tract infection by the age of 24 [25, 26]. The frequency of bacteriuria was found to be highest in the third trimester. This agrees with the findings of Okonko *et al.*, [27]; Sharma, [25] and Lawani *et al.*, [7]. It however differs from the findings of Turay *et al.*, [3] who reported higher bacteriuria in the 1st and 2nd trimesters. These differences may be as a result of fluctuations in urinary progesterone and oestrogens in the different trimesters of pregnancy [7]

The antibiogram studies show that the isolates were sensitive to some of the antibiotics within

the range of 70- 100%. These antibiotics include ofloxacin, ciprofloxacin, gentamycin and rifampicin. The resistance to other antibiotics namely ampicillin and augmentin may be due to the indiscriminate use of these drugs in the treatment of infections [20, 17].

Conclusion

The finding of this study highlights the need for health education for women especially during pregnancy with emphasis on personal and environmental hygiene. The presence of bacteriuria, even though most were asymptomatic, suggests the need for routine laboratory screening to ensure adequate treatment where infections are established.

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